MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2016/2017

ETN3056 – COMMUNICATIONS NETWORKS (TE)

22 OCTOBER 2016
2:30 PM – 4:30 PM
(2 Hours)

INSTRUCTION TO STUDENT

1. This Question paper consists of 4 pages (including this cover page) with 4 Questions only.

2. Attempt **ALL** questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please print all your answers in the Answer Booklet provided.

Question 1 (15 marks)

(a)   Suppose an organization lease a T-1 line between two sides.

   (i)   How many voice channels that a single T-1 line can support?   [1 Mark]

   (ii)   Prove that the gross data rate of T-1 line is 1.544Mbps.   [3 Marks]

   (iii) By using a 4-by-1 multiplexers and T-1 lines, show how the T-1 can be built to support a trasmission line with a speed of 98.816 Mbps. Given that the additional syncronization information can be neglected in the calculation.
   [4 Marks]

(b)   In a 1000-input-by-1000-output crossbar switch, only 1,000 users can be supported at maximum capacity.

   (i)   List **three (3)** advantages using multistage switches compared to a single switch with the same number of users.   [3 Marks]

   (ii)   Design a three stages of multistage switches for the similar single switch such that it is non-blocking system. Given that the first stage is using a switch with 25-input-by-49-output.
   [4 Marks]

Question 2 (15 marks)

(a)   Given that a small company allocated with few Internet Protocol version 4 (IPv4) addresses starting with 208.32.47.50/27.

   (i)   Find how many devices can be allocated with these address.   [2 Marks]

   (ii)   What is the last address for this block address?   [3 Marks]

   (iii) Identify whether these two IP addresses are within this block of address or not.
   11110000.00100000.00101111.00110010
   11010000.00100000.00111111.00110010

   [1 Mark]

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(b)   Name **three (3)** advantages of Passive Optical Network (PON) compared to Active Optical Network (AON).

[3 Marks]

(c)   Short for Asymmetric Digital Subscriber Line, ADSL is a type of DSL broadband communications technology used for connecting to the Internet. ADSL allows more data to be sent over existing copper telephone lines (POTS), when compared to traditional modem lines.

   (i)   Explain the term Asymmetric in ADSL. Why ADSL have greater bandwidth for downlink compared to the uplink?

[3 Marks]

   (ii)   What is the function of splitter in ADSL?

[1 Mark]

   (iii) Discuss how voice and non-voice can share the line to transmit both type of data.

[2 Marks]

Question 3 (15 marks)

(a)   The Institute of Electrical and Electronics Engineers (IEEE) 802.11 is the standard for Wireless Fidelity (WiFi) devices.

   (i)   Differentiate between Time Division Multiple Access with Frequency Division Duplex (TDMA/FDD) and TDMA with Time Division Duplex (TDMA/TDD) systems.

[4 Marks]

   (ii)   Can Carrier Sense Multiple Access with Collision Detection (CSMA/CD) be used in wireless networks? If not, why?

[2 Marks]

   (iii) How Request to Send (RTS) and Clear to Send (CTS) are used in CSMA with Collision Avoidance (CSMA/CA)?

[3 Marks]

(b)   Handover process is one of the important elements in mobile network.

   (i)   Why is handover needed in mobile network? How can handover be implement in WiFi network?

[4 Marks]

   (ii)   How channel bandwidth and MIMO help to improve the speed in IEEE 802.11ac?

[2 Marks]

Continued ....

Question 4 (15 marks)

(a)   What are the differences between LTE and LTE-Advanced?

[3 Marks]

(b)   A normal TDMA-GSM time slot consists of six trailing bits, 8.25 guard bits, 26 training bits, and two traffic bursts of 58 bits of data. Compute:

    (i)   The number of bits in a time slot

[2 Marks]

    (ii)   The number of bits in a frame

[2 Marks]

    (iii)   The number of overhead bits in a frame

[2 Marks]

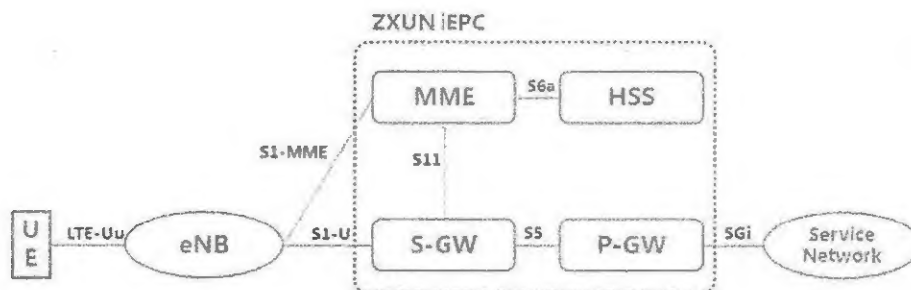   (iv)   Frame efficiency

[2 Marks]

(c)

Figure Q4

Figure Q4 shows the combined Global System for Mobile communication with Universal Mobile Telecommunications System (GSM/UMTS) network architecture.

    (i)   What is the function of P-GW or Packet Data Network (PDN) Gateway?

[2 Marks]

    (ii)   Other than send and received radio transmissions, what is the other function of eNB or eNodeB?

[1 Mark]

    (iii)   What is the purpose of Home Subscriber Server (HSS)?

[1 Mark]

End of Paper